January 16, 1851.

Lieut.-Col. SABINE, R.A., V.P. and Treasurer, in the Chair.

The Chairman, by desire of the President, read the following letter:—

"Downing Street, Jan. 6, 1851.

"My Lord,—I beg to inform your Lordship, that I shall set apart One Thousand Pounds, from the fund for Special Service, to be applied by the Council of the Royal Society in the same manner as the grant made for Scientific purposes last year.

"I have the honour to be,

"Your Lordship's obedient humble Servant,

"J. Russell."

"*The Earl of Rosse.*"

The following papers were then read:—

1. "On the Results of Periodical Observations of the Positions and Distances of Nineteen of the Stars in Sir John Herschel's Lists of Stars favourably situated for the investigation of Parallax contained in Part III. of the Phil. Trans. for 1826, and in Part I. for 1827." By Lord Wrottesley, F.R.S. &c. Received November 14, 1850.

In Sir John Herschel's papers above referred to, he shows that if a double star occupy a certain position with respect to the ecliptic, and one of the components be supposed to be very much nearer to the earth than the others, a considerable periodical and parallactic change will take place in their angle of position, and that the maximum variations from the mean position will occur at two opposite seasons of the year, which indicate the best times of observation of the parallax of the star. Sir John gives a list of stars thus favourably situated, with the coefficients of the maximum parallactic variation of the angles of position, and the times of their occurrence subjoined.

Lord Wrottesley having erected at his seat in Staffordshire an observatory provided with a good equatorial, determined to devote the instrument to a good trial of the method, and the present paper contains the results of his observations and researches.

The equatorial employed was that formerly belonging to Mr. Beaumont. Its telescope is of 10 feet 9 inches focal length, and the object-glass is of $7\frac{3}{4}$ inches clear aperture, and a good glass of its size. The instrument is mounted according to the usual English method for a fixed observatory, viz. with a long polar axis resting in Y^s at each end. This polar axis is 14 feet 3 inches long, and 10 inches square in the middle, having pivots at the ends of hard bell-metal. The Y^s above and below are attached to massive stone piers, supported by a very firm and large foundation of brick-work. The steadiness of the instrument is not satisfactory, compared with that of some recently-established equatorials. The observations were made with a parallel-wire micrometer, containing one fixed and two

moveable wires, and the value of its scale was well determined both by Mr. Beaumont and Lord Wrottesley. The power usually employed was 450.

In the progress of the observations it was found that they were attended with considerable difficulties, chiefly arising from the impracticability of obtaining a sufficient number of observations at both the proper periods of the year, and also from the circumstance that many stars require to be observed at an inconvenient hour in the early morning, when the observer, fatigued by night observing, is unequal to the task. The fact of the difficulty of the observations is evidenced by the paucity of the trustworthy results, after more than six years' uninterrupted observing, viz. from February of 1843 to October of 1849. Of sixty-nine stars proposed for observation only forty-eight have been observed, and of them nineteen only have been observed at both periods of the year. The results of the observations of these nineteen stars are given in the paper.

Four tables are given, the first of which contains the separate results for each day's observations of every star, both for distance and angle of position, with the probable error and weight of each, computed according to the ordinary formula of the calculus of probabilities, and also with the assigned arbitrary weight of each, estimated according to the judgment of the observers. It contains also estimations of the magnitudes and colours of the stars for each night.

The second table gives the similar results combined for each period of observation, with the computed weights and probable errors.

The third table gives the combined results of all the observations for the main epoch of observation, together with the approximate R.A. and N.P.D., and the whole number of observations.

The fourth table gives the results for the separate epochs for those stars only which afford reasonable hope of the detection of parallax, four stars being omitted as evidently binary systems, and some others whose components were equal in magnitude, and the observations of which did not give any indication of parallax, being also omitted. The differences of the angles of position, as indicating parallax, are distinctly exhibited, first as resulting from such observations as were made at consecutive and opposite seasons, and secondly as resulting from the comparison of all the observations made at one period of the different years with all made at the other period.

In discussing the final results, the author remarks that only three stars, viz. 118 Tauri, 100 Hercules, and Herschel 95, were observed satisfactorily at the opposite and consecutive seasons, and these exhibit such discordances in the partial differences, that it seems necessary in all cases to depend only upon the average difference of position obtained by comparing all the observations at one period of the different years, with all at the other period. He finds that there are then only five stars in the list, viz. 32 Eridani, 41 Aurigæ, δ Geminorum, an anonymous star in Cancer, and Herschel 95, which show differences in the proper direction, and so much greater than the probable errors as to deserve much attention, as exhibiting parallaxes measurable by this method, and, of these, δ Geminorum

is subject to great doubt, from the smallness of the number of the observations at the late period of the year.

The results however are entitled to rather more consideration in this respect, that, with regard to the greater numbers of the stars that are physically unexceptionable (that is, omitting binary stars, and those whose components are of equal magnitude), the directions of apparent change of position are favourable to the supposition of a measurable parallax. This is particularly the case with respect to 32 Eridani and Herschel 95, which the author in conclusion recommends to the notice of astronomers provided with adequate instruments for observing them.

2. "Magnetic Survey of the Eastern Archipelago." By Captain C. M. Elliot of the Madras Engineers. Communicated by Lieut.-Col. Sabine, V.P. Treas. R.S. &c. Received Jan. 15, 1851.

In the year 1845, the Committee of Physics of the Royal Society having expressed a wish that a Magnetic Survey should be made of the East Indian Archipelago, Captain Elliot was ordered by the Court of Directors of the East India Company to undertake that duty, after the close of the Singapore Magnetic Observatory. The observations at that observatory were discontinued at the end of the year 1845, but the instruments were still allowed to remain, that the portable instruments might be occasionally compared with them during the Survey.

The object which the author proposed to himself was the determination of certain magnetic lines within the limits of the Survey: the lines of no dip, and of the maximum horizontal component of the earth's force; the minimum intensity of the total magnetic force; and finally, the line of no declination. He was also desirous of observing the variations of the magnetic elements, and of ascertaining whether the changes of the declination, of magnetic intensity, and of the barometer, were uniformly similar over so large an area. The fixed stations for this latter purpose were sixteen in number, and the time employed at each station varied from a few days to several months. They were spread over an area of 28° of latitude, and more than 40° in longitude, viz. from 16° latitude north to 12° south, and from 80° to 125° longitude east. This part of the globe coincides very nearly with the position of minimum total force. Of the sixteen stations, nine were to the south of this line, three to the north, and four in its immediate vicinity. Four stations were in the islands adjacent to Singapore; one in Borneo; one in the island of Java; two in Sumatra; one in the island of Mindanao; one in Celebes; one at the Cocos or Keeling Islands, which was the most southern station to which Capt. Elliot could venture; one at Penang, and one in its immediate vicinity; one at Nicobar, an island in the Bay of Bengal; one at Moulmein, which was the most northerly, and one at Madras, which was the extreme westerly, station. The total number of days employed in observing at the fixed stations amounted to 496. The instruments employed at the fixed stations were, for the changes of declination, sometimes three, but never less